

Morphology and biology of the immature stages of *Acropteris iphiata* (Guenée) (Uraniidae) with notes on their similarity to those of Epiblemidae

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Abstract The larva and pupa of *Acropteris iphiata* (Guenée) were described and the close similarity to those of the epiblemid species was discussed.

Key words *Acropteris*, Uraniidae, *Epiblema*, immature stages, morphology.

Nothing had been known in Japan for the immature stages of the Uraniidae until one larva of *Acropteris iphiata* (Guenée) was found on *Metaplexis japonica* Makino (Asclepiadaceae) in 1990 (Yoshiyasu, 1991a). The larvae of same species were captured again in 1991. The authors studied them morphologically to consider the relationship of the Uraniidae to the Epiblemidae. In this paper, the larva and pupa were described with some biological notes, and the affinity between the two families was discussed under these results.

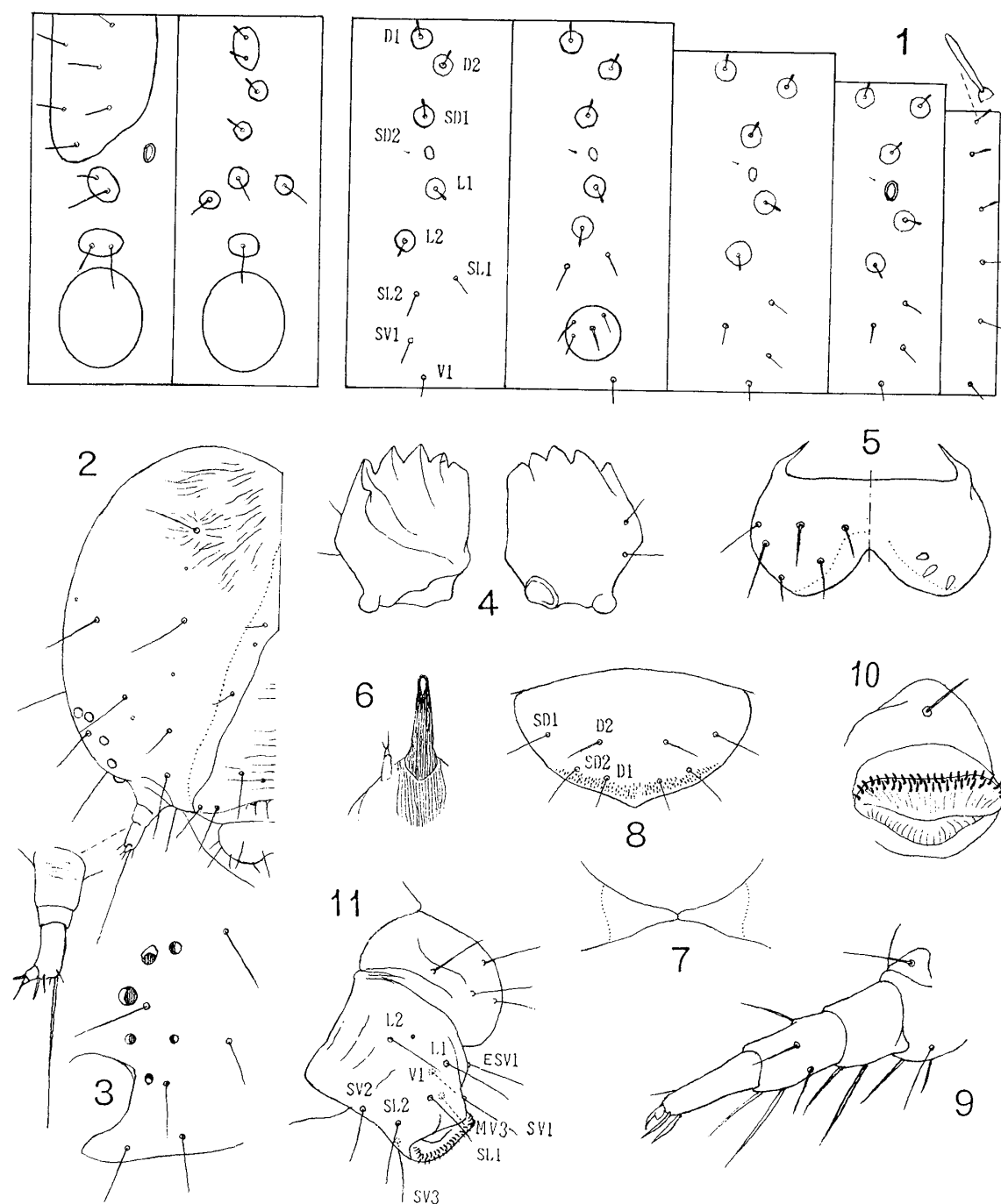
Descriptions of the immature stages

Mature larva. Body 16 mm long. Head pale orange-yellow, suffused with greenish along coronal suture, and body evenly pale green with a dark green dorsal thick line, pinnacula pale brown.

Head: smooth but some wrinkles present near vertex; coronal suture of equal length to the height of frons; adfrontal suture indistinct, apical part prolonged slenderly; ocelli 4-6 very small and one-fourth of ocelli 2 and 3 in diameter; emargination in anterior margin of labrum two-fifths the length of labral height, epipharyngeal setae small; mandible with five outer teeth and a relatively narrow grinding tooth, 1st outer tooth on ridge from 2nd tooth to oral face, without inner tooth, condyle for posterior articulation and socket for anterior articulation small; hypostoma tapering off to distal end and meeting on the meson, hypostomal sulcus more or less sinuated; spinneret narrowly cylindrical and three times as long as labial palpus. Af2 situating at the level of apical end of frons; P1 and L1 on the same level of Af1; O1 inside of ocellus 3 and SO1 of ocellus 5.

Body: thoracic shield not so stiff; thoracic leg relatively long, tarsus with halbert-like apical setae; prolegs on 3rd to 6th abdominal segments, crochets in biordinal mesoserries, 25-30 in number; anal shield slightly protruding at caudo-meson. Anal proleg with scarcely protruded hypoproct; scar of spiracle (Nakamura, 1992) ventro-caudad of L2; L2 dorso-cephalad of L1; SL2 (Nakamura, 1992) directly cephalad of SL1; SD1 and SD2 within thoracic shield; L setae two in number on prothorax; V1 wanting on thoracic segments; D2 close to D1, particularly on 1st and 2nd abdominal segments; L1 ventrad of spiracle and L2 ventro-cephalad of L1; SL1 and SL2 present; SV one in number on 1st-2nd and 7th-9th segments, and four on 3rd-6th segments (SVe bristle). D and SD on meso- and metathorax and D, SD and L on abdomen claviform.

Pupa. 8.7-9.3 mm long, 3.0-3.3 mm wide. Reddish brown. Rather stout. Fourth-8th



Figs. 1-11. Larva of *Acropteris iphiata* (Guenée). 1. Chaetotaxy. 2. Head, frontal view, left half. 3. Do., ocellar region. 4. Mandible, inner and outer views. 5. Labrum. 6. Spinneret. 7. Hypostoma. 8. Anal shield, dorsal view. 9. Thoracic leg. 10. Proleg. 11. Anal proleg, lateral view.

abdominal segments punctate.

Head rather broad; labral piece large; mandible ill-defined; labial palpus and maxillary palpus concealed; maxilla extending to 4/5 length of wing; antenna ending at apex of wing; distal end of suture defining eye-piece touching prothoracic leg; apical portion of adfrontal suture only presented as a short oblique suture; F and two Af setae present.

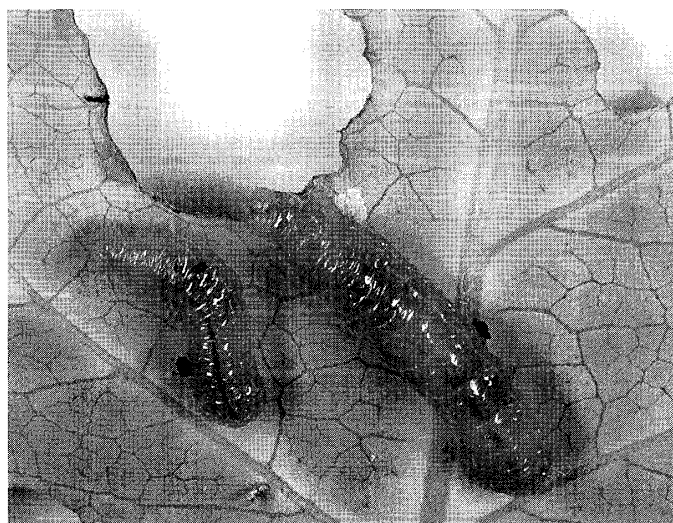


Fig. 12. Larvae of *Acropteris iphiata* (Guenée) on host leaf.

Prothorax relatively small; suture between pro- and mesothorax touching antenna at a point of suture restricting basal margin of prothoracic leg; prothoracic leg extending to 7/11 the length to apex of wing, proximal end appearing cephalad from that of mesothoracic leg, femur never appearing, mesothoracic legs reaching 8/9 length of wing, caudal portions from the position of tips of maxillae meeting on the meson but apices never meeting; proximal ends of pro- and mesothoracic legs appearing from cephalad of labral level; metathoracic leg appearing; forewing broad; hindwing hidden under forewing at 4th abdominal segment and appearing again between meso- and metathoracic legs; abdominal spiracles present on 2nd-8th segments and degenerated on 8th one; dorsal and lateral grooves never present; cremaster scarcely visible with four pairs of hooked setae.

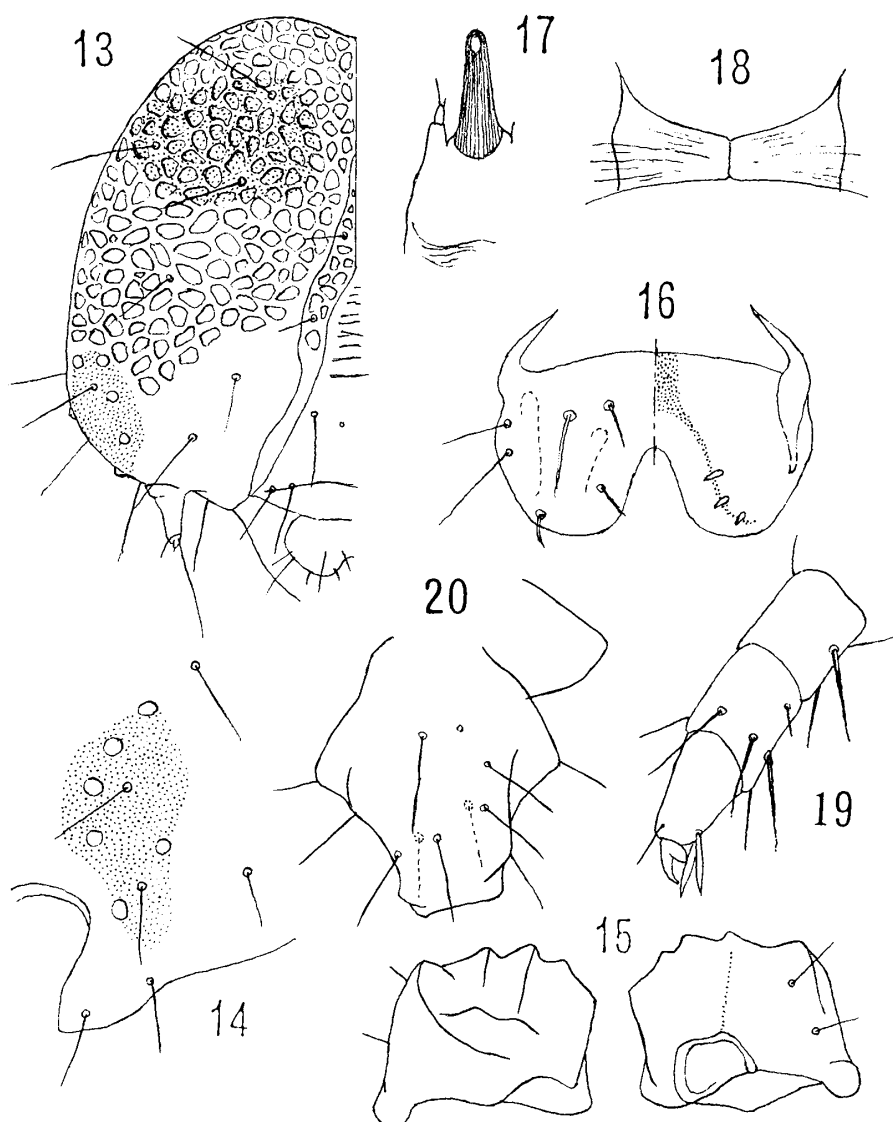
D1 and SD1 present on each thoracic segment; both D1 and D2 on 1st to 7th abdominal segments and D1 only on 8th segment; SD1 on 2nd to 8th segments; L1 on 4th to 7th segments; L2(=L1, Nakamura, 1981) and SV1 on 5th to 7th segments.

The type of the forewing tracheation pattern (Nakamura, 1984) is A-a-3.

Specimens examined: 6 larvae, Yokaichi, Shiga Pref., 28. viii. 1991, of which 4 pupated on 29. viii. to 2. ix. and 1 ♂ 1 ♀ emerged on 8-9. ix. 1991 (Y. Yoshiyasu and S. Kaneno); 1 larva, Shugakuin, Kyoto Pref., 6. xi. 1991, pupated on 9. xi. 1991 and emerged (♂) on 15. iii. 1992 (Y. Yoshiyasu).

Biological notes

The larvae are not active and do not make any nest under the leaves of *Metaplexis japonica* (Thunb.) Makino in the field. They feed usually on the host leaves by cutting circularly the blade between diverging veins. This habit is considered to protect secreting the latex fluid from the leaf as seen, but in a different way, in one pyralid species (Yoshiyasu, 1991*b*). Full grown larvae spin leaves by coarse meshed silken net for pupation. Pupal period is about 10 days under a 20°C condition. As the larvae were found in June, late August and early November in the field (Yoshiyasu, 1991*a* and this paper), the species seems to be trivoltine in the Kinki district, Honshu. One larva taken in November, 1991 at Kyoto, pupated in the same month, remaining in the pupal stage towards the next spring under a



Figs. 13-20. Larva of *Epiplema moza* (Butler). 13. Head, frontal view, left half. 14. Do., ocellar region. 15. Mandible, inner and outer views. 16. Labrum. 17. Spinneret. 18. Hypostoma. 19. Thoracic leg. 20. Anal proleg.

20°C and long daylength condition. The adult emerged in March after 5°C dark treatment for a month. From this the species is considered to overwinter in the pupal stage.

Holloway (1987) noted that the larvae of *Acropteris* sp. show "a degree of specialisation on the family Euphorbiaceae, particularly *Endospermum*, though larvae have also been noted from Asclepiadaceae", and *A. iphiata* is a Asclepidaceous feeder. On the other hand, the larvae of some Japanese *Epiplema* are known to link with *Daphniphyllum macrophodum* Miq. and *D. teijsmanni* Zollinger of the Euphorbiaceae, indicating the known hosts in the both families seem to be related.

Homogeneity of *Acropteris* Geyer (Uraniidae) and *Epiplema* Herrich-Schäffer (Epiplemidae) based on the morphology of immature stages

Brock (1971) included the Epicopeiidae in the Uraniidae in his comparative study of some adult morphological characters, and placed the Epiplemidae under the superfamily

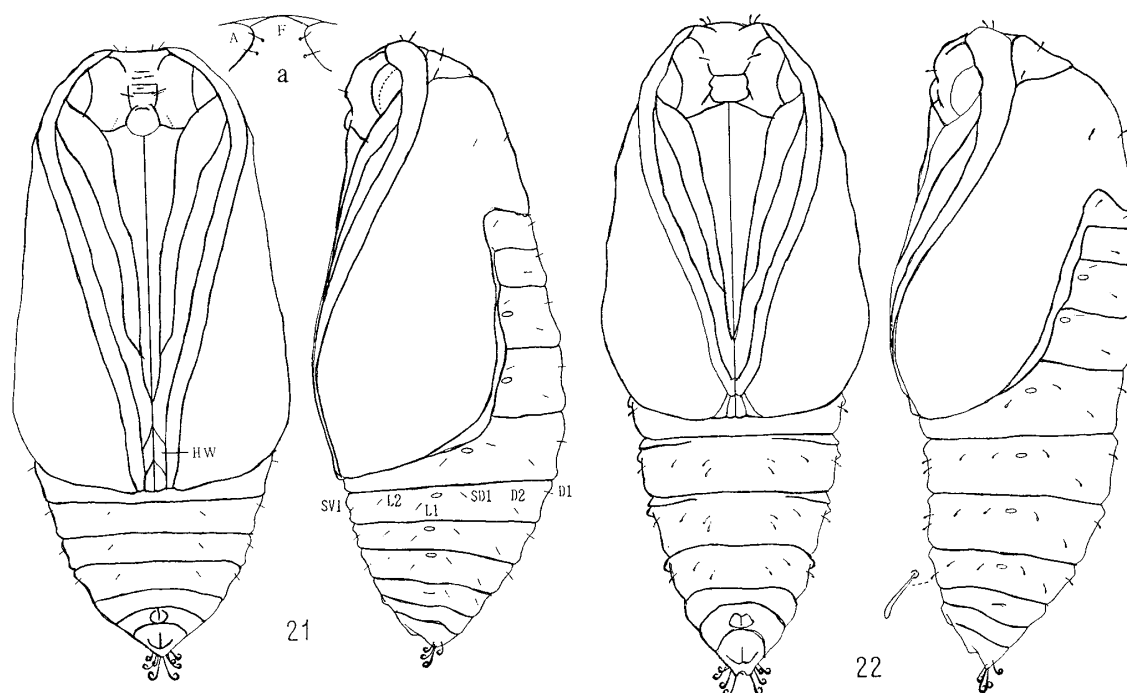


Fig. 21. Pupa of *Acropteris iphiata* (Guenée) (HW : hind wing). a : cephalic portion of head, showing apical part of adfrontal suture (A : antenna, F : frons).

Fig. 22. Pupa of *Epiplema moza* (Butler).

Geometroidea. Holloway (1976) combined the Uraniidae and the Epiplemidae without any indication. Recently Minet (1983) designated the Epiplemidae as a synonym of the Uraniidae mainly based on the morphology of male and female tympana.

The larva and pupa of *Acropteris iphiata* (Guenée) are considerably different from those of the epicopeiid species but are much similar to *Epiplema* spp. (*E. moza* (Butler) was illustrated in the paper). In the larva, V1 absent on each thoracic segments; D2 situated in proximity of D1 seta particularly on 1st and 2nd abdominal segments; L1 ventrad of spiracle and L2 ventrad of L1; SL2 present; SV one in number on 1st, 2nd, 7th and 8th segments and four on 3rd-6th segments; SL2 present on anal proleg (as an example, the chaetotaxy of *Epiplema cretacea* Butler, see Kodama, 1959); crochets of a proleg in biordinal meseries. In the pupa, labrum large; labial and maxillary palpi concealed; hindwing appearing on the ventro-meson; proximal end of prothoracic leg appearing from cephalad of labral level; identical pattern of chaetotaxy; cremaster absent; four pairs of cremastral hooked setae, etc. In the cocoon, large meshed silken net spun between the host leaves.

On the other hand, *Acropteris iphiata* shows some slight differences from *Epiplema*: larva with mandible lacking distinct inner teeth, labrum without deep emergination in anterior margin, SO2 seta ventrad of a line between ocelli 5 and 6 (in *Epiplema* the seta on the line) and distal end of hypostoma not abrupt; pupa with antenna reaching apex of wing.

The most important traits of *A. iphiata* shared with *Epiplema* species are the presence of SL2 seta on the larval abdomen and concealed labial palpus in the pupa. These traits are also shared with the geometrid species (cf. Nakamura, 1981). However, the transverse groove on the mid-dorsum of 10th segment of the pupa, which is considered to be an apomorphic character of the Geometroidea (Minet, 1991), is not found in *Acropteris iphiata*.

Based on the morphology of immature stages, the affinity of the Uraniidae and the Epiplemididae suggested by Minet (1983) and the Brock's (1971) treatment including the Uraniidae to the Geometroidea can be supported.

Literature Cited

- Brock, J. P., 1971. A contribution towards an understanding of the morphology and phylogeny of the Ditrysian Lepidoptera. *J. nat. Hist* 5: 29-102.
- Holloway, J. D., 1976. Moths of Borneo with special reference to Mount Kinabalu. 264 pp. Malayan Nature Society, Kuala Lumpur.
- , 1987. The Ditrysian 'Macrolepidoptera' superfamilies, *In* Betts ed., *CIE Guides to Insects of Importance to Man* 1: 133-188.
- Kodama, T., 1959. The larva of *Epiplema cretacea* Butler (Epiplemididae). *Tyô Ga* 10: 7-9 (in Japanese).
- Minet, J., 1983. Etude morphologique et phylogenetique des organes tympaniques des Pyraloidea. 1. Generalites et homologies (Lep. Glossata). *Annls Soc. ent. Fr.* (N.S.) 19: 175-207.
- , 1991. Tentative reconstruction of the ditrysian phylogeny (Lepidoptera: Glossata). *Entomologica scand.* 22: 69-95.
- Nakamura, M., 1981. Key to the classification of the Japanese lepidopterous pupae. *Tyô Ga* 32: 1-12.
- , 1984. The pupal forewing tracheation of Lepidoptera. *Ibid.* 34: 133-154.
- , 1992. A proposal for setal homology and nomenclature on the anal pod of the lepidopterous larva. *Ibid.* 43: 53-61 (in Japanese).
- Yoshiyasu, Y., 1991a. *Metaplexis japonica* (Asclepiadaceae) as the host of *Acropteris iphiata* (Guenée) (Uraniidae). *Japan Heterocerists' J.* 162: 201 (in Japanese).
- , 1991b. New host record and feeding habit of *Glyphodes quadrimaculalis* (Lepidoptera, Pyralidae). *Jap. J. Ent.* 59: 774.

摘 要

ギンツバメの幼生期の形態と習性並びにそれらとフタオガ科に対する類似性（中村正直・吉安裕）

ギンツバメ *Acropteris iphiata* (Guenée) の幼虫と蛹の形態並びに習性について記載した。本種の幼虫はガガイモの葉を食するが、この植物が出す乳液を避けるためか、写真にみられる如く葉を分脈の間でほぼ円形に截り取る特異な喰べ方をする。

最近、Minet (1983) は主として雄、雌成虫の鼓膜器官の特異な位置や形態の比較検討から、ギンツバメの属するツバメガ科 Uraniidae にフタオガ科 Epiplemididae を合一させた。この両科の幼生期の形態について比較した結果、幼虫では各胸節共 V1 を欠き、第 1, 2 腹節の D2 が D1 に近接し、各腹節の L1 が気門の腹方に位置し、SL2 を有するなど、蛹では、同一の特異な刺毛式を示す他、下唇鬚や小腮鬚が現れず、前脚の基部が上唇の位置より頭方から認められ、後翅が腹中部で小さく現れ、また類似した構造の繭を造るなど多くの共通の形質を示すことが判明した。従って Minet の取り扱いの幼生期の形態上からみても妥当なものと考えた。これらの形質の幾つかはまたシャクガ科の幼生期とも共通したものである。

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